

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

39. (Original) A method for controlling a temperature control system in a heating, ventilation and air conditioning system, wherein the control system includes a controlled device that can be actuated to change the controlled variable, comprising:

determining the sensitivity of the controlled device;

receiving a measurement of the controlled variable;

actuating the controlled device based at least in part on a difference between a desired value of the controlled variable and measured actual value and a sensitivity of the controlled device to predict an amount of actuation necessary to achieve the desired condition.

40. (Original) The method of Claim 39, wherein the sensitivity of the controlled device comprises a slope of a response curve of change in the controlled variable per adjustment of the controlled device.

41. (Original) The method of Claim 40, wherein the controlled device is a damper associated with a Variable Air Volume (VAV) box.

42. (Original) A temperature control system, comprising;
a controlled device that can be actuated to change the controlled variable;
a sensor for measuring the controlled variable; and
a microcontroller configured for executing computer-executable instructions that perform the steps of:

determining the sensitivity of the controlled device,

receiving a measurement from the sensor,

actuating the controlled device based at least in part on the sensitivity of the controlled device to achieve a controlled variable reading within a predetermined range of a desired value.

43. (Original) A method of Claim 42, wherein the sensitivity of the controlled device comprises a slope of a response curve of change in the controlled variable per unit adjustment of the controlled device

44. (Original) A method of Claim 42, wherein the controlled device is a damper associated with a Variable Air Volume (VAV) box.

45. (Withdrawn) A method for controlling a Variable Air Volume (VAV) box in a VAV temperature control system, the method relying on a PID control having a proportional term, an integral term, and a derivative term, the method comprising:

receiving a room temperature measurement and calculating a temperature error between the room temperature and a temperature setpoint;

defining at least two distinct regions of operation based at least in part on a temperature error, wherein each region has a predetermined gain set;

based on the temperature error,

(i) determining a region of operation,

(ii) calculating a PID output using a gain set associated with that region, and

(iii) calculating an airflow setpoint using the calculated PID output;

after the expiration of a time increment, re-measuring the room temperature, re-calculating the temperature error and repeating steps (i)-(iii).

46. (Withdrawn) A method of Claim 45, wherein at least one gain set comprises significantly increasing the PID output and accumulating the integral term at an accelerated rate.

47. (Withdrawn) A method of Claim 45, wherein at least one gain set comprises updating the proportional term but not updating the integral term.

48. (Withdrawn) A method of Claim 45, wherein at least one gain set comprises updating the proportional term and the integral term.

49. (Withdrawn) A method of Claim 45, wherein at least one gain set comprises incrementing the integral term at a fixed rate not varying with the error.

50. (Withdrawn) A method of Claim 45, wherein at least one gain set comprises implementing derivative control action by enabling or disabling an integral action.

51. (Withdrawn) A Volume Air Volume (VAV) temperature control system, comprising:

a VAV box having an airflow control damper for controlling an airflow delivered to a room and an airflow sensor for measuring the airflow;

a temperature sensor within the room measuring the temperature of the room; and

a microcontroller configured for executed computer-executable instructions for performing a PID control having a proportional term, an integral term, and a derivative term, the computer-executable instructions comprising:

calculating a temperature error between the room temperature and a temperature setpoint;

defining at least two distinct regions of operation based on the temperature error, wherein each region has a predetermined gain set;

based on the temperature error,

(i) determining a region of operation,

(ii) calculating a PID output using a gain set associated with that region, and

(iii) calculating an airflow setpoint using the calculated PID output;

after the expiration of a time increment, re-measuring the room temperature, recalculating the temperature error and repeating steps (i)-(iii).

52. (Withdrawn) A system of Claim 51, wherein at least one gain set comprises significantly increasing the PID output and accumulating the integral term at an accelerated rate.

53. (Withdrawn) A system of Claim 51, wherein at least one gain set comprises updating the proportional term but not updating the integral term.

54. (Withdrawn) A system of Claim 51, wherein at least one gain set comprises updating the proportional term and the integral term.

55. (Withdrawn) A method of Claim 51, wherein at least one gain set comprises incrementing the integral term at a fixed rate not varying with the error.

56. (Withdrawn) A method of Claim 51, wherein at least one gain set comprises implementing derivative control action by enabling or disabling the integral action.